



## SuperGen UK Centre for Marine Energy Research Annual Assembly 2012

# Large Scale Interactive Coupled Modelling of Environmental Impacts of Marine Renewable Energy Farms



# **Ecological surveys and studies to investigate the effects of Marine Energy Converters are:**

## **Time consuming**

- Months to Years to determine seasonal influences

## **Costly**

- Sub-tidal surveys require boats, divers and equipment

## **Generally reactive**

**A more efficient approach is to develop 2 and 3D linked hydrodynamic-ecological models**

**Potential to be:**

-Reactive & allow forecasting

**Aim:**

Demonstrate the ability to numerically model the change in ambient hydrodynamics resulting from the installation of wave and tidal device arrays and couple the models to associated ecological models.

## Approach:

Exploitation of different modelling approaches using 2 and 3D modelling.

Software:

- MIKE (DHI)
- Fluidity-ICOM (Imperial College Ocean Model)
- GOTM (General Ocean Turbulence Model)
- ERSEM (European Regional Seas Ecosystem Model)

### **Two major advantages of using this approach**

1. Output of results are not model specific
2. Development of open source tools to be enjoyed by the wider community

## **Approach cont.**

Parameterise the relevant biological processes, especially related to:

- Benthic detrital dynamics
- Plankton growth
- Fish population dynamics

**& then...**

Apply the coupled hydrodynamic-ecological models to a number of specific test cases.

## Novelty

Makes use of a range of readily available commercial and open source software

Parameterisation of relevant biological and physical processes – these will be tested to give realistic results

Special focus will be given to the potential **positive** effects of arrays

## The Partners



Wave, tidal and ecological modelling using Mike 21, wave tank and full scale tidal stream expertise, strong background in EIA



Developers of Fluidity-ICOM, developer of ocean scale circulation model, collaboration with tidal stream developer



Key agency in UK for research in EIA, strong expertise in wind farm development, fisheries ecology and general ocean & coastal ecology